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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/714,331	11/16/2000	Howard M. Branz	NREL-99-01	4337

23712 7590 12/07/2001

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT PAPER NUMBER

1765

DATE MAILED: 12/07/2001

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Please find below and/or attached an Office communication concerning this application or proceeding.

MF-2

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/714,331	BRANZ, HOWARD M.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1917 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>1</u> | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 7, line 2, "predetermined" thickness is indefinite because it specifies a limitation that is determined beforehand. It is suggested that "predetermined" be deleted.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 8-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Hollingsworth (US 5,759,745).

Hollingsworth teaches a method of forming a hydrogenated amorphous silicon layer (Abstract and column 2, lines 48-55). The method comprises:

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depositing a thin photoresist layer of hydrogenated amorphous silicon (a-Si:H) onto a substrate surface (column 3, lines 45-59; column 4, lines 27-34 and 40-50) by plasma enhanced chemical vapor deposition (column 4, lines 43-50);

exposing UV light to a-Si:H layer (column 5, line 61 – column 6, line 4) to remove hydrogen atoms off of the surface of the a-Si:H layer, in which the missing hydrogen atoms vacate "dangling bonds" (high densities of a light induced defect) associated with silicon atoms at the a-Si:H surface (column 6, lines 11- 14). The dangling bonds are only formed at or very near the surface of the a-Si:H layer regardless of the overall thickness of the layer (column 6, lines 27-31), reads on illuminating the surface with an ultraviolet light to form high densities of a light induced defect near the surface; and

etching the a-SiH layer with an etchant containing hydrogen atoms that are emitted using an RF plasma or an ECR plasma source (column 7, lines 18-35) reads on etching the surface to remove the defect, since it is well known that etching deactivates the dangling bonds (defects) that are present on the surface of a substrate.

Hollingsworth's method teaches using a high temperature a-Si (a-Si:H) in forming thin film transistors in liquid crystal display devices where certain electrical properties of an a-Si are critical to proper operations of such devices (column 5, lines 8-50), which reads on using the amorphous hydrogenated silicon film in an electronic device.

Since Hollingsworth's method is practiced in an in-line treatment system wherein the substrate of other such article being treated remains in an evacuated environment throughout the entire procedure (column 8, lines 15-25), then the steps of depositing,

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exposing UV light to, and etching the a-Si:H layer, reads on growing, illuminating, and etching are performed as steps in an a-Si:H film deposition process.

Hollingsworth's method further comprises using hydrogenated amorphous silicon, which is equivalent to silicon-based alloys that contain carbon or germanium (column 3, line 56 0 column 4, line 5).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollingsworth as applied to claim 1 above, and further in view of Shimbo (US 4,624,737).

Hollingsworth differs in failing to teach etching comprises using a liquid etchant, **in claim 4**; and etching to remove 500 - 10,000Å of the surface, **as in claims 4 and 5**.

Shimbo teaches etching hydrogenated amorphous silicon by known wet, plasma and reactive ion etching methods (column 2, lines 5-60). Using Shimbo's etching method to remove hydrogenated amorphous silicon, which is the same method and material as claimed in the present invention, would result in removing 500 – 10,000Å of the surface.

Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hollingsworth by using the etching method as taught by Shimbo for the purpose of using a few masking operations to produce a thin film that has good contact characteristics.

Hollingsworth differs in failing to teach after etching, repeating the steps of illuminating and then etching for a plurality of cycles wherein a population of a two-hydrogen complexes is increase in a bulk of the film, **in claim 6** and the plurality of cycles is for a number sufficient to reduce the hydrogenated amorphous silicon film to a predetermined thickness, **in claim 7**.

It is well known that illuminating amorphous hydrogenated silicon produces dangling bonds (defect) and etching deactivates the dangling bonds that are present on the surface of a substrate.

Hence, it would it would be inherent that by repeating the cycle of illuminating then etching the amorphous hydrogenated silicon would result in a population of a two-hydrogen complexes is increased in a bulk of the film and the plurality of cycles is for a number sufficient to reduce the hydrogenated amorphous silicon film to a predetermined thickness.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner can normally be reached on Second Friday.

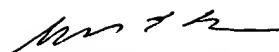
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December 5, 2001

  
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